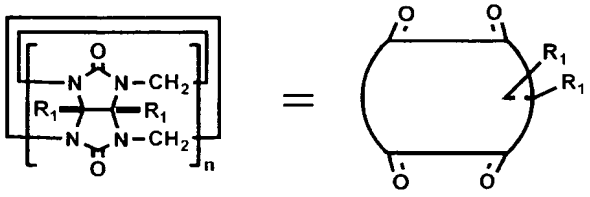
Claims

[1] A polymer in which a particle-type polymer with a reactive end-substituted group is linked to a cucurbituril derivative of Formula 1 below by a covalent bond:



(1)

wherein n is an integer of 4 to 20, and each R_1 is independently a substituted or unsubstituted alkenyloxy group of C_2-C_{20} with an unsaturated bond end, a carboxyalkylsulfanyloxy group with a substituted or unsubstituted alkyl moiety of C_2-C_{20}, a carboxyalkyloxy group with a substituted or unsubstituted alkyl moiety of C_2-C_8, an aminoalkyloxy group with a substituted or unsubstituted alkyl moiety of C_1-C_8, a hydroxyalkyloxy group with a substituted or unsubstituted alkyl moiety of C_1-C_8, or an epoxyalkyloxy group with a substituted or unsubstituted alkyl moiety of C_2-C_8.

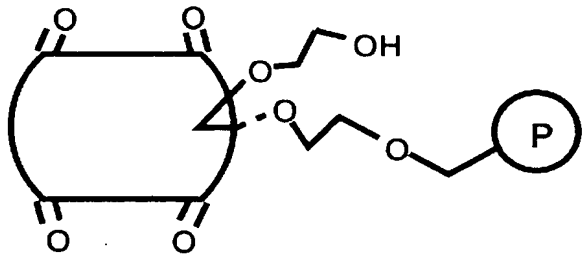
[2] The polymer of cl aim 1, wherein the reactive end-substituted group is a halogen atom, a substituted or unsubstituted amino group, an epoxy group, a carboxyl group, a thiol group, an isocyanate group, or a thioisocyanate group.

[3] The polymer of claim 1, wherein the particle-type polymer with the reactive end-substituted group is a Merrifield polymer or an XAD polymer.

[4] The polymer of claim 1, wherein the particle-type polymer has an average particle size of 5-300 ㎛ .

[5] The polymer of claim 1, wherein the covalent bond is an ether bond, a sulfanyl bond, an amino bond, an ester bond, an amide bond, a thioamide bond, or a urea bond.

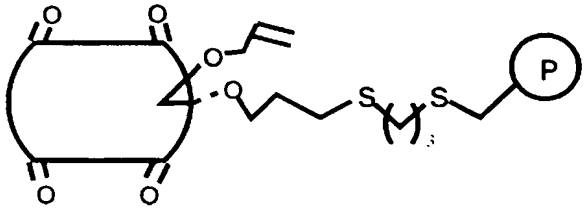
[6] The polymer of claim 1, which is a compound of Formula 2 below:



(2)

wherein P is a polymer residue.

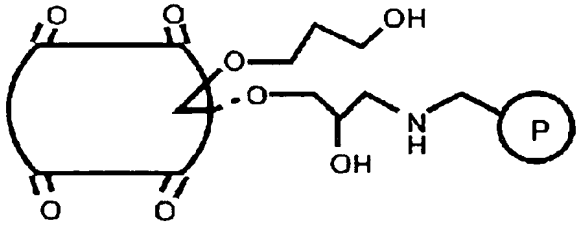
[7] The polymer of claim 1, which is a compound of Formula 3 below:



(3)

wherein P is a polymer residue.

[8] The polymer of claim 1, which is a compound of Formula 4 below:

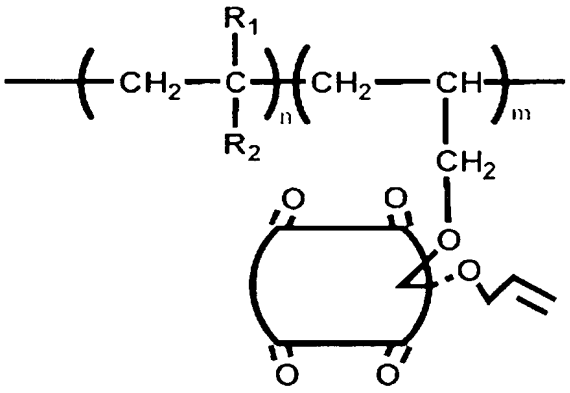


(4)

wherein P is a polymer residue.

[9] A polymer in which the cucurbituril derivative of Formula 1 of claim 1 is copolymerized with a monomer with a substituted or unsubstituted alkenyl group of C_3-C_{20}.

[10] The polymer of claim 9, which is a compound of Formula 5 below:



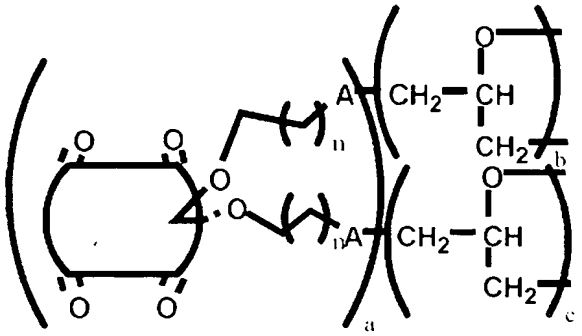
(5)

wherein n is an integer of 100-10,000, m is an integer of 10-5,000, R_1 and R_2 are each independently a substituted or unsubstituted aryl group of C_6-C_{30}, a carboxyl group, a substituted or unsubstituted heterocycle group of C_4-C_{30}, a substituted or unsubstituted alkyl group of C_1-C_{20}, a halogen atom, a cyano

group, an amino group, a substituted or unsubstituted aminoalkyl group of C_1-C_{10}, a hydroxyl group, a substituted or unsubstituted hydroxyalkyl group of C_1-C_{10}, a substituted or unsubstituted alkenyl group of C_3-C_{10}, or hydrogen.

[11] The polymer of claim 10, wherein the cucurbituril derivative of Formula 1 of claim 1 where R_1 is an allyloxy group is copolymerized with the monomer with a substituted or unsubstituted alkenyl group of C_3-C_{20}.

[12] The polymer of claim 9, which is a compound of Formula 6 below:

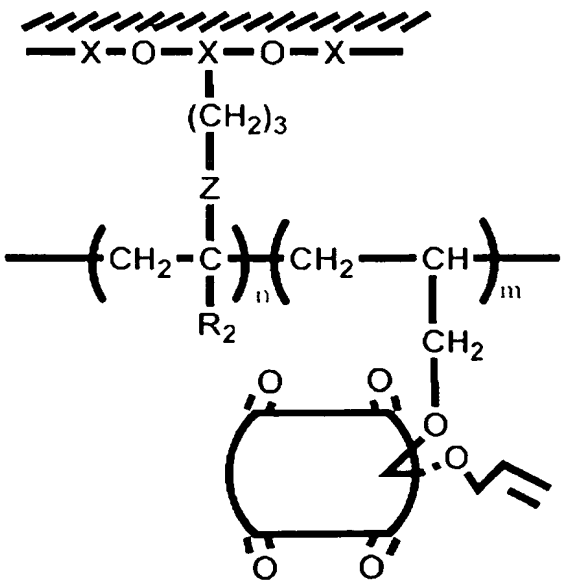


(6)

wherein A is NH or O, n is an integer of 1-8, and a is an integer of 10-2,000, b and c are each independently an integer of 100-10,000.

[13] The polymer of claim 12, wherein the cucurbituril derivative of Formula 1 of claim 1 where R_1 is an aminoalkyloxy group or a hydroxyalkyloxy group with an alkyl moiety of C_2-C_9 is copolymerized with epichlorohydrin or epibromohydrin in the presence of a base.

[14] A polymer of Formula 7 below:



(7)

wherein n is an integer of 100-10,000, m is an integer of 10-5,000, Z is an amide bond, an ester bond, a urea bond, a thiourea bond, an amine bond, or an ether bond, R_2 is a substituted or unsubstituted alkyl group of C_1-C_{10}, a substituted or unsubstituted aryl group of C_6-C_{30}, a carboxyl group, a substituted or unsubstituted heterocycle group of C_4-C_{30}, or hydrogen, and X is Si, Al, or Ti.

[15] A filter material in which the polymer of Formula 7 of claim 14 is covalently bonded to a glass wool, a filter, or a cellulose.

[16] A monolithic column obtained by a process comprising:

dissolving a monomer with a substituted or unsubstituted alkenyl group of C_3-C_{20} and allyloxycucurbituril of Formula 1 of claim 1 where R_1 is an allyloxy group in a solvent to obtain a solution;

sequentially adding a porogen and a 0.2-5% by weight of a radical initiator, based on the total weight of reactants, to the solution;

inputting the reaction solution in a column tube with a sealed end and sealing the other end of the column tube;

stirring the reaction solution at 60-80 °C for 15-30 hours; and

washing the column tube.

[17] The monolithic column of claim 16, wherein the monomer is one or more selected from the group consisting of acrylamide, acrylic acid, methacrylic acid, methacrylamide, vinylpyrrolidinone, styrene, methylenebisacrylamide, and methacrylbutylester.

[18] The monolithic column of claim 16, wherein the porogen is a primary alcohol of C_2-C_{18}, methylenechloride, or chloroform.

[19] The monolithic column of claim 16, wherein the radical initiator is AIBN (2,2'-azobisisobutyronitrile), $K_2S_2O_8$, ammonium persulfate, or benzoylperoxide.

[20] A monolithic column obtained by a process comprising:

allowing a solution of silane with an alkenyl group of C_3-C_{20} in acetone to flow down through a capillary tube for 10-30 minutes;

sealing both ends of the capillary tube and incubating the capillary tube for 10-30 hours;

washing the inside of the capillary tube with acetone and water;

dissolving a radical initiator, a monomer with a substituted or unsubstituted alkenyl group of C_3-C_{20}, and allyloxycucurbituril of Formula 1 of claim 1 where R_1 is an allyloxy group, in water or a mixed solvent of water and acetone, and

adding the reaction solution to the capillary tube;

sealing both the ends of the capillary tube and incubating the capillary tube at room temperature for 10-30 hours for copolymerization; and

washing the capillary tube.

[21] The monolithic column of claim 20, wherein the monomer is one or more selected from the group consisting of acrylamide, acrylic acid, methacrylic acid, methacrylamide, vinylpyrrolidinone, styrene, methylenebisacrylamide, and methacrylbutylester.

[22] The monolithic column of claim 20, wherein the radical initiator is AIBN, $K_2S_2O_8$, ammonium persulfate, or benzoylperoxide.

[23] A stationary phase for column chromatography using the polymer of any one of claims 1 through 14.